ments; of the trouble and anxiety their caprices give at home and in the workshop they have no knowledge. The organ-pipe is brought into the lecture-room, it is caused to prove what is wanted, more is not looked for; it comes like a beauty in a ballroom, dressed up to play a part and be amiable and gracious: the practical man knows that organ-pipes are very like human beings, of whom Goethe says, "We do not learn to know people when they come to us; to learn their real peculiarities we must go to them."

April 18 HERMANN SMITH

Rock Inscriptions of Brazil

BEING unable to attend the reading of Mr. Whitfield's paper, at the Anthropological Institute, April 22, the following observations are offered.

The rock inscriptions of Brazil are worthy of attention, because they appear to belong to a vast series, to which Mentone affords a large contribution. The suggestion that in the very earliest epochs tally records existed, lends interest to the investigation. It appears probable that military tallies of the levy of men preceded the registers in the historical period of the tribute of men, arms, and money by provinces, such as we find in Herodotus with regard to Persia.

In reference to the possible general connection of such inscriptions as these with the eastern world, it may be observed that Brazil has participated in at least two great migrations.

The Kiriri and Sabuyah of Bahia are allied by language to the ancient Pygmean or Negrito stock. This race is everywhere very low, and cannot have produced even these inscriptions.

The greater part of Brazil is covered by the Guarani or Tupi (Agua) languages allied to the Agau of the Nile region, the Avkhass of Caucasia, &c. It is worth inquiry whether the Mentone inscriptions may not belong to this epoch.

HYDE CLARKE

Abnormal Coloration in Fish

SEEING Mr. W. S. Kent's letter on this subject in NATURE of the 8th inst., a similar instance was recalled to my memory. About three weeks ago I observed in a fishmonger's shop a plaice, nearly one third of the under side of whose body (at the tail) had the usual colour and orange spots of the upper. In this specimen the spots were more numerous and brilliant than usual. The line of demarcation was irregular, but abrupt. The circumstance struck me because I have seen great numbers of Pleuronectidæ, but never one marked thus. The fishmonger told me that he had never seen a like specimen.

ARTHUR NICOLS

Phosphorescence in Wood

FROM the description given by your correspondent, Richard M. Barrington (vol. vii. p. 464) of phosphorescence in coniferous wood, I should imagine it to be extremely probable that the pieces of Scotch fir in question were infested with the spawn of *Polyporus annosus* Fr., a fungus very common on the Coniferæ. The mycelium of this plant (as well as the perfect fungus) is well known to be at times highly phosphorescent, and in the *Gardener's Chronicle* for September 28, 1872, I have figured the perfect state of it as seen so commonly in a luminous condition in the coal mines of Glamorganshire. In these deep pits the spawn of this fungus ramifies about the old shoreing timber, and is so highly phosphorescent as to be clearly seen from a distance of twenty yards. Many other fungi with their mycelia are known to be at times phosphorescent, as *Polyporus sulfureus* Fr. and *Corticium cæruleum* Fr., both common on decaying wood.

In the *Gardener's Chronicle* for September 21, 1872, the Rev. M. J. Berkeley has published a remarkable case of phosphorescence in logs of larch. Here the most luminous parts were where the mycelium was most developed, and the wood gave out such a blaze of white light that although the pieces were wrapped in five folds of paper, yet the light shone through as if the specimens were exposed. The phosphorescence appears to accompany the decomposition of the wood on which the fungi at the same time prey.

W. G. SMITH

Coincidence of the Spectrum Lines of Iron, Calcium, and Titanium

IN Prof. Young's letter published in NATURE, vol. vii., p. 17, some coincidences of the lines of different substances which "are too many and too close to be all the result of accident" are referred to, those of iron with calcium and titanium being especially cited. Two explanations are offered, first that "the metals operated upon by the observers who first mapped out the spectra were not absolutely pure," and second, that "there is some such similarity between the molecules of the different metals as renders them susceptible of certain synchronous periods of vibration."

If we are driven to this second explanation the received inductions of spectrum analysis and the deductions of celestial chemistry based upon them are shaken at their foundation, for if more than one known terrestrial element can display identical lines in the spectrum, the suggestion that other unknown celestial elements may do the same is freely opened. It is therefore very desirable that the spectroscopist should receive all the aid which the studies of chemical specialists can afford him towards the solution of this problem.

I may venture to speak to the instances quoted by Prof. Young. First as regards calcium and iron. In making analyses of a large number of brands of pig iron I found that they all contained calcium, but in very variable proportions, and endeavoured by observing their properties, and by further examination of finished iron, to learn how the presence of calcium affected the quality of iron, but failed to solve this problem. In the course of these investigations, I found that the finished iron, like the pig, presented considerable variations as regards the quantity of calcium contained in it, *but I never found a sample of iron or steel quite free from some trace of calcium*. As I was operating for the most part on superior qualities of iron which had been submitted to the utmost practicable degree of commercial purification, this experience renders it extremely probable that Prof. Young's first explanation is the correct one, so far as iron and calcium are concerned.

The want of any chemical reagent by which minute traces of titanium can be detected in the presence of large quantities of iron, or of a means of completely separating these metals, places a serious difficulty in the way of directly answering the question whether iron is usually associated with traces of titanium; but there are indirect evidences of its very common existence in ordinary iron. The most decided of these is afforded by the common, almost universal, occurrence of the beautiful copper-coloured crystals of cyano-nitride of titanium in the hearth bottoms of blast-furnaces. In many cases their concretions form large masses, where the ores that have been used are not supposed to be titaniferous.

Metallic iron obtains impurities, not only from its ore, but also from the fuel and flux used in reduction, and besides these from the furnace or crucible in which it has subsequently been fused or raised to its welding point. The difficulty of completely purifying iron is so great that many such coincidences as those referred to may be expected *a priori*.

W. MATTIEU WILLIAMS

Musical Stones

WHEN roaming over the hills and rocks in the neighbourhood of Kendal, which are composed chiefly of mountain limestone, I have often found what we call here "musical stones." They are generally thin flat weather-beaten stones, of different sizes and peculiar shapes, which when struck with a piece of iron or another stone, produce a distinct musical tone, instead of the dull heavy leaden sound of any ordinary stone. The sound of these stones is, in general, very much alike, but I know gentlemen who possess sets of eight stones which are said to produce, when struck, a distinct octave. Being only an amateur geologist, I am unable to account for this fact, and would be glad if any of your numerous readers would take the trouble to explain to me, through the medium of your columns, the peculiar composition of the stone in question, and the distinct qualifications nencessary to form a musical stone.

RICHARD J. NELSON

Acquired Habits in Plants

IN NATURE of May 1, p. 7, which I chance not to have seen till now, Mr. Babbington puts a question on the subject of my climbing specimen of violet which I fear I am not botanist enough to answer.

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I described it as a "dog" violet simply because it bore leaves and flowers on the same stem, which in my simplicity I supposed was enough to settle its species. But though the subdivisions of *V. canina* be new to me, a word or two of remark and description may elucidate the required point to other eyes. I would add that the specimen, such as it is, is very much at Mr. Babbington's service should he care to see it. It is still recognisable, no doubt, though it suffered considerably from having no better protection for some hours than a fly-book.

In the first place it was not growing in a moist situation or one to account for luxuriance. Though near the river, it was many feet above the water, and was on the further side of a small high road. In this position it had, as I before mentioned, attained a height of two feet and a half, and the flower which first attracted my eye was almost on a level with my waist. The plant had climbed through the hedge like a vetch or a fumitory. On comparing it with the most robust specimens of *V. canina* which I can find this spring, the following points of resemblance and of divergence present themselves. The stem of mine is channelled in the ordinary way, and the leaves tolerably like in shape though rather more pointed. On the other hand, the leaf-stalks and peduncles are in mine much shorter, the upper leaves being almost senile. The position of the bracts is similar, but instead of the conspicuous stipules of *V. canina*, mine has those parts so small as almost to escape notice. Again, while the stem of *V. canina* does not in my experience branch, the stem of mine has, in two places, thrown off a small branch bearing leaves and flowers. Also there was not, as far as I remember, any trace of any shoot from the root except the one stem, while *V. canina*, as ordinarily found, sends up a greater and a lesser flowering stem and a bunch of leaves besides.

I hope that these particulars will shed more light on the subject than I can myself. J. G.

St. Asaph, May 10

JOHN STUART MILL

BORN MAY 20, 1806; DIED MAY 8, 1873

THOUGH it has not been the custom among specialists to regard Mr. John Stuart Mill as a scientific man, yet we venture to say that he has not left behind him in this country any man who has done more for the general advancement of science. Before Mr. Mill's time men found their way to great discoveries, and succeeded in proving to each other that what they had discovered was scientific truth. But they could tell each other very little about the method of scientific investigation. Indeed Whately, the then greatest authority in logic, pronounced a theory of induction impossible. Mr. Mill, however, did formulate the canons of induction, and in so doing he lit a lamp which will for ever burn a steady guiding light in the path of the scientific inquirer. And the value of this light need be regarded as none the less even if we consider that its chief service lies in guiding us past the snares and pit-falls of error, and the entrances to those mazes and endless labyrinths of unreality in which so many powerful intellects have toiled and spent their strength for nought; nay, worse than in vain, for their brilliant struggles have fascinated thousands and drawn them from the sober highway of truth, which alone is the road to usefulness—to happiness. The vast and still growing influence that Mr. Mill has exerted in this direction is fully recognised by those who regret it most, because they believe that Truth may be reached by other and nobler paths. We are content to note the fact that among the great men of our day no one has done so much as he, to widen the domain of science and to subdue to its methods all subjects of human interest. Choosing for the field of his more serious labours several of the most difficult subjects of research, those that had most eluded the grasp of the understanding, he has enriched the world with works that will long remain monuments of science. His "Logic" is our text-book of the science of evidence. His "Political Economy" is our text-book of the science of wealth. And if there is a scientific work on politics it is Mr. Mill's "Representative Government." One feature of Mr. Mill's character deserves special notice in this connection. He had the true scientific temper, a disinterested love of truth, in a degree not to be surpassed. If it could be shown that in any particular his teaching was unsound, and none were ever able to do this so well as his own disciples, the men whom he had trained to think, no one was more glad that error had been detected than was Mr. Mill himself. It will be enough to remind our readers of one notable example of this. When Mr. Thornton showed that the universally accepted doctrine of the wage-fund was a huge fallacy, Mr. Mill came forward with alacrity to acknowledge that he in common with all other political economists had fallen into a grave error, and that Mr. Thornton had made a most valuable contribution to economic science. If all scientific men could as completely subordinate their personal vanity to the pursuit of truth, progress would be more rapid than at present. The daily papers have already made the reader familiar with the many-sided richness and beauty of Mr. Mill's character. He was an object of loving admiration to all who had the happiness to enjoy his personal acquaintance. The world, while it mourns his loss, does not, cannot know how great and how good a man has been taken away; and still less does it know how ill it can afford to lose such a man.

MINERS' RULES IN THE SEVENTEENTH CENTURY

ON looking over a packet of old papers I have found some documents, of which I enclose copies, written by a German miner, named Brandshagen, who was employed by my ancestor, Sir Philip Egerton, to superintend the attempt to work copper in the New Red Sandstone strata of Cheshire in the year 1697. As the *rules* for miners of that age afford so strong a contrast to the *unruly* behaviour of that class at the present day, they may perhaps interest some of the readers of NATURE. P. DE M. GREY-EGERTON

Worthy & most honourable Sir,—

Your worship give most humbly thanks for employment meself and my countrymen about your Worship mines, which I have enjoyed now above 4 weekes, & not to be att all further unacquainted unto your Worship, I could not forbeare to give a true & plain account of what I have observed in this time about these mines, as good as my smal understanding in y^e English linguage would permit, & if it was in any way acceptable then my wishes & desires where fullfilled. I have this time also endeavored to blow up y^e rocks by guns powder, as the best way to kill them, butt in y^e first time I found y^e elements as aire & water where against my designe, y^e last I have conquered, & I hope I shall doe so y^e other next time when I have occasion for it. I found also some other smal things which would not so soon agree with my hands, for there are many years past, that I did work under ground with my owne hands, butt all these things are now disceased, onely that I was lately too covetous & would have more rocks blown up then my powder was able to; what other blasts for effect have done, your Worship can be informed of it by Mr. Smith. I shall endeavour all what is in my power to serve your Worship with that understanding I have about mines to which I have employed meself now above 15 year, in spending a great deal of money as well for learning as travelling in many places in Europe where good mines where, to come to any perfection in this art. I have received now my things for examination of y^e oare, which I will doe as soon as possibly I can come to it in this desolate place, where nothing in y^e world is to be had for any commodities what soever it may be, & whilst we are strangers here, & must buy all things for ready, it is impossible to life of what your Worship has allowed unto us & there-

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